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Declass Review by NGA.

[redacted]

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14 December 1965
A #7587
Reg. No. 2554

[redacted]

Subject: Progress Report Number Five
Improved Rear Projection Screen System

Gentlemen:

The following report summarizes the progress on the project since Progress Report Number Four dated 19 November 1965. The report format has been changed so as to relate more directly to the tasks defined by Project Approval Requests (PAR's) set forth in [redacted] Proposal 3-2554B dated 5 March 1965, and to reflect the report outline example recently furnished to [redacted]

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A letter has been submitted under separate cover to the Contracting Officer requesting a contract extension of three months. The need for the extension is due to late delivery of one piece of government owned equipment required for conduct of a large portion of the inorganic phosphor research. The equipment is an AST-200 RF Sputtering Unit, ordered from [redacted] on 25 August 1965. Promised shipment date from [redacted] was late November 1965 at the time of Purchase Order placement. Since that time, the promised shipment date has slipped to 15 February 1966. Some delivery slippage could have been tolerated by rescheduling research and development activities, however, this is no longer possible, thus an extension in delivery is necessary.

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Task: PAR No. 1 - Chemical and Electro-Chemical Screen Development

Discussion: During the last reporting period effort was started to find a unifying symmetry or asymmetry in complex organic phosphors with the anticipation of defining the fluorescence mechanism and of predicting new efficient phosphor molecules. In the brightest organic phosphors investigated to date a similarity in checmical constitution has been detected. They are all metal-organic compounds with the metal ion attached to a benzoyloxy group.

Radiant intensity measurements were taken on (11) single component organic activator coatings in the form of resin solid solutions. The more favorable phosphors consisted of Fluorol 7GA and Uranine B, being of equal intensity, with Brilliant Yellow 6G base being appreciably the brightest. Spectrophotometer spectra revealed the following fluorescence excitation peaks for these activators and emission peak for one of the sensitizers with strong near UV absorption.

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Trade Name	Chemical Name	Excitation Wavelength	Emission Wavelength
Fluorol	2, 8 dimethyl ceroxene	4200,4800Å	-
Uranine	sodium fluorescein	4600	-
Brilliant Yellow 6G	naphthamide derivative	4100	-
Calcofluor White RW	coumarin derivative	-	4300Å

The excitation peaks of Fluorol and Brilliant Yellow 6G are more closely matched to the emission peak of Calcofluor White than is the excitation peak of Uranine, indicating that the former activators would yield the most efficient phosphor system when compounded with this sensitizer provided that the activator and sensitizer molecules are strongly coupled, i.e., wave functions overlap.

The degree of progress attained on the various phases of the phosphor program are estimated below:

Phase	Estimated Percent Completed	Anticipated Percent Completed
Theoretical	60	60
Experiments, Organics	75	60
Experiments, Inorganics	12	50

Planned Activities: Theoretical activity planned for the next reporting period will involve calculations on fluorescence conversion efficiency in double organic coatings, taking into account the photophysical processes of UV absorption, non-radiative resonance transfer and concentration quenching and maintaining visible transparency by adjustment of the phosphor concentration and coating thickness parameters. Ligand-field group theory will be applied to the problem of determining the effect of dipolar hybrid structure formation in simple functional radicals on the energy sequence of ordering the ground and excited singlet and triplet ligand levels when an excited electron is transferred to the bonded metal ion.

Experimental activity for the next reporting period will be devoted to the study of spectrally matched compounded aromatic phosphor coatings, scanning the organic chelates and vacuum evaporting thin films of activated zinc sulfide and zinc silicate. Sputtering of inorganic phosphor films has been delayed until late February 1966.

At the end of the next reporting period the overall remaining task will include aging studies on the brightest, transparent double organic phosphor coatings and inorganic thin film phosphors, research on antireflection coatings and electric field effects, and evaluation of lamp: screen systems.

Task: PAR No. 2, Extended Lamp Source

Discussion: The survey and evaluation of potential U.V. Light Sources can be considered complete within the scope contemplated for this project. Specifications for an extended lamp source have been formalized with [redacted] 25X1
25X1 [redacted] and a purchase order placed for a lamp housing, two lamps (one close grid, and one spiral grid pattern), and a power supply.

Planned Activities: Delivery is promised by the end of February 1966 at which time tests will be made of the radiation pattern of the lamps. There are two alternatives for further activity based on the test results: (1) If the radiation pattern is found to be unsuitable for condensing and projection, then either a better lamp grid arrangement may be in order, or it may be necessary to drop the extended source lamp as means of obtaining U.V. radiation. (2) If the radiation pattern is satisfactory, then work will begin on a suitable condensing system.

Task: PAR No. 3, Light Source Study

Sub-Task: Investigation of U.V. Light Sources

Discussion: The survey and evaluation of available U.V. Light Sources can be considered complete within the scope contemplated for this project. The results of the survey and the evaluation of the information obtained has been published in previous progress reports. Under separate cover, permission has been requested from the Contracting Officer to let a CPFF sub-contract to [redacted] 25X1
25X1 [redacted] for a high efficiency, ultraviolet light source.

Planned Activities: Further effort in this area will essentially be limited to sub-contract management for the duration of the proposed sub-contract.

Sub-Task: Projector Optics Development

Discussion: Effort in the area of projector optics is primarily dependent on the configuration and radiation pattern of the U.V. Light Sources.

Planned Activities: Work in the area of projector optics will begin as preliminary information on the U.V. Light Sources becomes available. It will not receive additional emphasis until delivery and test of the light sources.

Task: PAR No. 4, Bandwidth Limited and Special Purpose Optics

Sub-Task: Zoom Lens Investigation

Discussion: The survey and evaluation of potential sources for U.V. Zoom Lenses is contained in previous progress reports. In a recent meeting with the Technical Officer, it was agreed that effort in this area should remain minimal investigatory level for a period of about two months while further work was done in the area of basic phosphor research and more efficient light sources.

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Planned Activities: At this point in the program, it is advantageous to let a sub-contract to [redacted] for the design of a mechanically compensated, Zoom Lens System. Their proposal has been discussed in previous progress reports. A letter has been submitted to the Contracting Officer under separate cover requesting approval to let a study contract to [redacted] 25X1

The attached Funding Commitment Report shows the current project financial status.

Sincerely,

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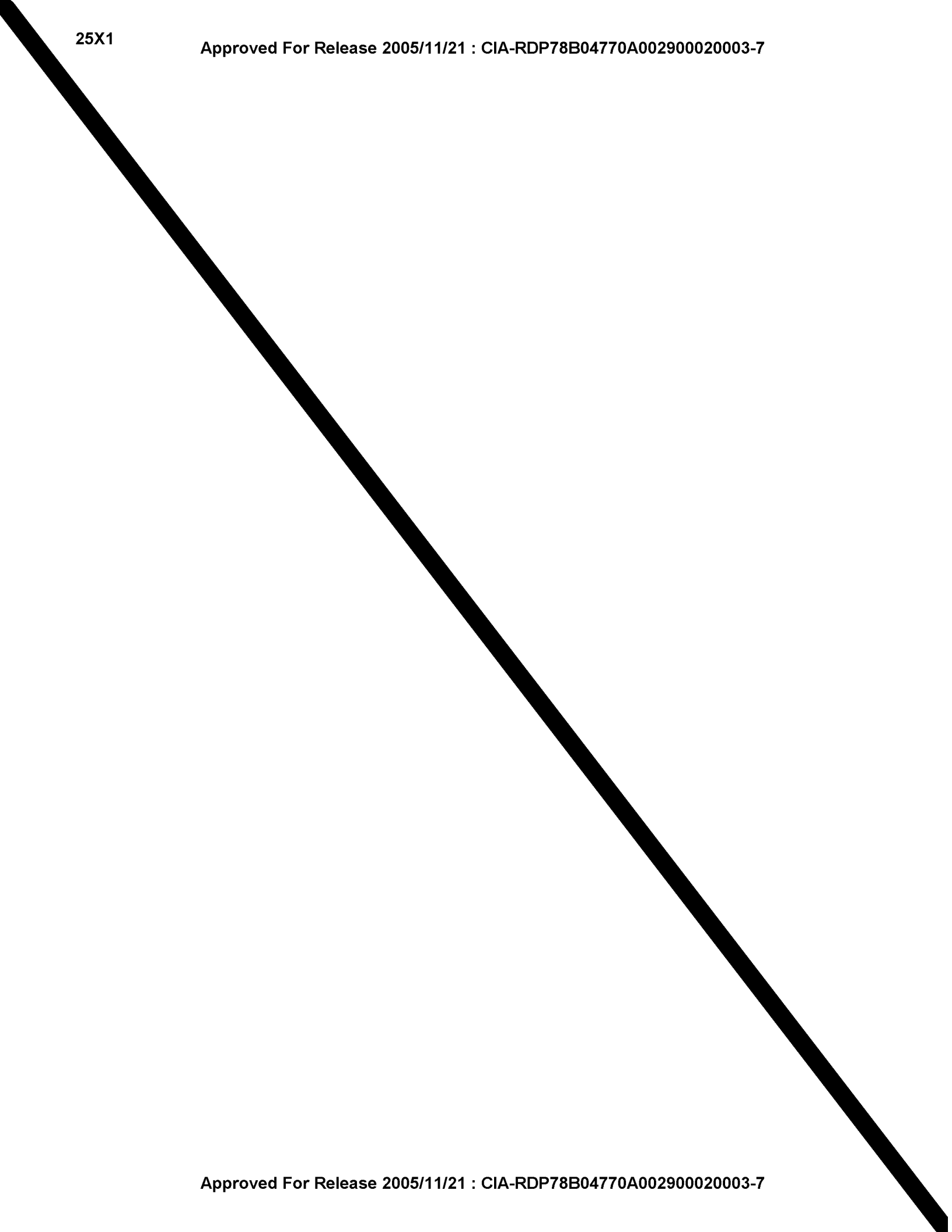
[redacted]

WDS:ELF:MR:ja



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